Review Article

Pragmatic management of myogenous temporomandibular disorder—a narrative review

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Background and Objective: Chronic pain is recognized as a disease state. Not understanding a complex chronic pain entity runs the risk of suboptimal diagnosis and management. The resulting undertreatment may exacerbate or perpetuate the state of chronic pain. Myofascial masticatory pain may well be one such entity. Several hypotheses implicate both local tissue pathology and central sensitization to play a role individually, or concomitantly. This narrative review aims to underscore three key factors that undermine the current management of masticatory myofascial pain—a lack of understanding of disease pathogenesis, its complex clinical heterogeneity, and the subjectivity in determining the choice of intervention.

Methods: This non-systematic narrative review abstracts contemporary (up to 2022) literature on masticatory myofascial temporomandibular disorders (mTMD) pathophysiology and management published in PubMed database.

Key Content and Findings: Currently, the choice of intervention in mTMD is primarily driven by the clinician's expertise and subjective preferences. This manuscript briefly reviews current therapeutic options in mTMD. It summarizes emerging data supporting using the Temporo-masseteric Nerve Block (TMNB) as a diagnostic and therapeutic measure in its management.

Conclusions: The TMNB injection holds promise as a means for diagnostic triage and therapeutic intervention in the management of mTMD. Until a more objective and quantitative diagnostic measure/s-based definition of mTMD has been identified that can, in turn, dictate targeted therapeutic intervention/s, clinicians managing mTMD may benefit from using the TMNB injection to gauge response and escalate care accordingly, Future research is warranted to validate its utility in the pragmatic management of mTMD and in identifying the need for multi-disciplinary patient management.

Keywords: Masticatory myofascial temporomandibular disorder (mTMD); Temporo-masseteric Nerve Block (TMNB); diagnosis and management

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Introduction

Background

Masticatory myofascial pain, the most common type of temporomandibular disorder (TMD) refers to chronic pain that originates from the jaw muscles/myofascial and associated soft tissues. It affects nearly 5 million individuals in the US (1-3). The International Classification of Orofacial Pain (ICOP) subcategorizes myofascial pain into that of primary and secondary origin.

Table 1 The search strategy summary

Items	Specification
Date of search	1/15/2022–3/15/2022
Databases and other sources searched	PubMed
Search terms used	Temporomandibular disorder
Timeframe	Contemporary PubMed literature up to March 2022
Inclusion and exclusion criteria	Inclusion criteria: review, research publications, case reports and series in English language
Selection process	By author opinion and collaborative discussion

Rationale and knowledge gap

Myofascial pain secondary to acute soft tissue injury and inflammation is usually easily diagnosed and managed, with the resolution of pain concomitant with tissue healing. However, understanding primary myofascial pain (referred to as 'mTMD' in this manuscript) and the cause of pain persistence after tissue healing have been the significant challenges (4-7).

Objective

The key questions addressed in this narrative review are twofold—what forms the basis for our current understanding of masticatory myogenous TMD's etiology and diagnosis and how our understanding can impact its management. We present the following article in accordance with the Narrative Review reporting checklist (available at https://joma.amegroups.com/article/view/10.21037/joma-22-14/rc).

Methods

The method employed for the narrative review is summarized in *Table 1*.

Discussion

Current understanding and basis of management of myofascial TMD (mTMD)

To date, the diagnosis of mTMD relies largely on patient history and clinical examination (8). In the absence of definite histopathology and of any quantitative assessment to corroborate clinical impression, the practitioner's clinical assessment is subjective and variable. mTMD is often characterized by the presence of myofascial trigger points, described as tender areas within taut bands of skeletal muscles, that when stimulated by palpation, produces the pain that spreads to the surrounding area, or refers to distant sites (4,9). Clinically, trigger points are subdivided into active and latent. Both are painful upon palpation, but only the former reproduces the patient's chief pain complaint (5,9).

The definition and etiology of myofascial pain are not fully understood. For instance, the role of the pathognomonic trigger points in mTMD pain has generated much fundamental debate, including whether they are the result or the cause of myofascial pain, even whether they are necessary or sufficient for developing myofascial pain is debatable. In fact, the 2020 National Institutes of Health (NIH) Helping to End Addiction Long-term Initiative Workshop on Myofascial Pain acknowledged this critical question's challenge and scientific opportunity (10). Many theories have been proposed to explain myofascial pain without rigorous validation.

Some hypotheses of primary myofascial pain development suggest that abnormal muscle load, such as sustained contraction or repetitive movements, or malfunction of the muscle motor end-plate with spontaneous release and increased availability of acetylcholine, cause peripheral inflammation and potential tissue damage (11-15). This may additionally result in peripheral muscle nociceptor and central sensitization.

Fascial tissues investing all muscle tissues are in close contact with the muscle fibers, and its generous innervation may likely contribute to myofascial pain pathophysiology (10). The Myofascial unit hypothesis implicates the fascial tissues as a significant contributing factor in myofascial pain pathogenesis. The fascial tissues house the muscle spindles and Golgi corpuscles and contain free nerve endings capable

of transmitting pain in certain conditions (16). The fascial tissues demonstrate changes with age and exhibit responses to sex hormones and endocannabinoids, consistent with mTMD risk factors such as increasing age, female sex, and also emotional/psychological burden (3,17). Clinical manifestations of peripheral sensitization would comprise complaints of pain with jaw function or increased pain due to local pressure (11,12,15).

The increased and persistent nociceptive input from the central nervous system from the sensitized peripheral afferents may result in secondary afferent hyperexcitability, a phenomenon also known as central sensitization, and can explain painful pain features observed in mTMD, such as spontaneous pain and pain extending beyond the original site of injury (18,19).

It is conceivable that all these theories hold true and that multiple mechanisms/combinations of mechanisms may be operational in the pathogenesis of myofascial pain. Thus, the etiology of masticatory myofascial pain may be multifactorial. This can explain the heterogeneous and complex clinical presentation of mTMD. mTMD can present predominantly as a 'local' phenomenon, confined to the masticatory myofascial tissue or as more 'global' in its extent involving mechanisms at the central nervous system level. These phenotypes were observed in the OPPERA (Orofacial Pain: Prospective Evaluation and Risk Assessment) study (3,17).

mTMDs in the kaleidoscope of chronic pain

The OPPERA study was a seminal, large population-based prospective study designed to identify the risk factors that contribute to the onset and persistence of TMDs. These risk factors were identified as biopsychosocial, environmental or genetic (20). Some of the self-reported factors in subjects with painful TMDs were greater occurrence of trauma to the jaw, parafunctional behaviors, increased pain intensity in the face and jaw area, modification of pain by jaw function, stiffness or cramping, joint noises, headaches, and even, chronic pain in other parts of the body (3,17).

It was notable that the prevalence of high-impact pain, defined as high-intensity pain or moderate/high levels of self-reported pain-related interference, was nearly four times higher among those with orofacial pain than without. Further, individuals with high impact pain had higher pain sensitization and more significant tenderness to palpation of multiple body sites (3,17,21).

The psychosocial risk factors for chronic TMD subjects included higher levels of psychological and affective distress, greater stress perception and catastrophizing, and increased somatic awareness (22).

The OPPERA study clustered individuals who had a higher risk of developing painful TMDs- namely, the adaptive, pain-sensitive, and global symptoms clusters. Individuals in the adaptive cluster may have more localized pathology, whereas the individuals in the other two clusters are thought to have more pain sensitivity due to central sensitization (23).

The data suggested that mTMD could either be an isolated presentation or a part of a constellation of phenomena with more 'generalized' or 'central' mechanisms. Accordingly, TMD pain is often comorbid with migraine, fibromyalgia, and other types of generalized pain.

Management of mTMDs

Perhaps not surprisingly, multiple modalities exist for the management of myofascial pain- dry needling, trigger point injections, oral appliances, acupuncture, and tissue mobilization, to name a few (24,25). A recent meta-analysis of a systematic review on treatments for myogenous TMD suggested that the most efficacious therapies were manual therapy, counseling, local anesthesia (trigger point injections) and appliance therapy; however, there is a considerable level of controversy, mainly due to methodological heterogeneity. This results in a low level of evidence for most treatments and underscores the need for better quality studies (26,27).

Counseling and self-care

Counseling may vary from patient education regarding the condition, prognosis, and self-care techniques, to more specific cognitive-behavioral therapy (CBT). Counseling is usually combined with other treatment modalities and seems beneficial for both acute and chronic conditions (28).

Intraoral appliance

The oral appliance is the most common therapeutic intervention for mTMD (27). Multiple designs of oral appliances are described in the literature. A full-coverage hard acrylic appliance, covering either the maxillary or mandibular arch, with bilateral centric contacts against opposing teeth, especially for long-term use, may be recommended to reduce the chances of occlusal changes. Cost, time-lapse for fabrication, and regular maintenance might be some of its disadvantages but most importantly

are the caution towards the proper fabrication and patient's instruction regarding its use (25,29).

Physiotherapy

Tissue manipulation, also known as manual manipulation or therapy, includes manipulation of soft tissues and joints of the head and neck. There are different techniques, and the generally desired outcomes include improvement of muscle spasm, local circulation, and adhesions with increased range of motion and pain. This therapy requires multiple sessions performed by a physical therapist (30,31).

Trigger point injection

It consists of administering local anesthetic without a vasoconstrictor into an identifiable trigger point in taut bands of skeletal muscles (13). Network meta-analysis of systematic reviews have concluded that local anesthetics delivered as trigger point injections alleviate pain and improve maximum mouth opening for at least 6 months (32). Trigger point injections are technique-sensitive and require the accurate diagnosis, localization, manipulation of the trigger points, and medication delivery (33).

Dry needling

Dry needling is a therapeutic modality for myofascial pain usually performed by physical therapists and consists of the insertion of thin solid needles into myofascial trigger points, tendons, ligaments, and scar tissues (34). This modality has been suggested to reduce peripheral pain and sensitization (29).

Acupuncture

Acupuncture is a therapy modality based on Chinese Medicine and consists of inserting multiple thin solid needles in specific points, called acupoints. It is performed by a trained professional in a series of regular visits. Multiple acupuncture methods have been suggested to improve pain-limited mouth opening and quality of life (35). Acupuncture is considered an adjunct to formal therapies for mTMD, due to the limited evidence on its efficacy in mTMD (24).

Additionally, there is emerging support for oral pharmacotherapy with medications such as pregabalin (36).

It is crucial to recognize that the knowledge gap that currently exists in the field in validating the relative effectiveness of various treatment modalities is not one that can be bridged by more critical assessment of existing literature in the form of additional systematic reviews or meta-analyses beyond what already exists in the literature. As can be inferred from this manuscript, multiple such analyses have been performed and published- in contrast, there is a dearth of rigorously designed, prospective comparisons of promising treatment modalities through randomized, multi-blinded (operator-, evaluator- and subject-blinded) clinical trials capable of objective patient assessment, unbiased treatment assignment and outcome measurement. Until such a time, there may be benefit in exploring alternate strategies that lend themselves to simple treatment delivery and less ambiguous assessment of patient response. Recently, we developed an additional modality of treatment- the Temporo-masseteric Nerve block (TMNB), a.k.a. the Twin block, as it was formerly referred to (37-41).

The TMNB as a novel tool in the management of mTMDs

The TMNB is a local anesthetic injection that targets the deep temporal and masseteric branches of the Mandibular division (V3) of the Trigeminal Nerve, the fifth cranial nerve (*Figure 1*) (40,41). The original impetus behind the development of the TMNB was the argument that interrupting the relay of pain signals from the muscle would relieve the patient's pain symptoms, regardless of whether the origin of pain were trigger points in the muscle or the surrounding soft tissue. In addition, the ability to selectively interrupt the innervation to the facial muscles could help differentiate masticatory myogenous pain from odontogenic pain by isolating the source of pain when encountering patients with difficulty localizing their source of pain (42).

Serendipitously, we observed that pain relief from TMNB was often sustained for a period of weeks-months, far outlasting the duration of the local anesthetic itself (clinical observation of authors). This presented the possibility that the TMNB may have therapeutic value in relieving pain from the masseter and/or the temporalis muscles. The mechanism for TMNB's prolonged pain relief is yet to be uncovered; we speculate that the innervation to the masseter and temporalis being mixed (sensory and motor), administration of the local anesthetic affects the motor activity of the muscles. This may, in turn, interrupt the 'pain co-contraction pain' cycle implicated in chronic pain, thereby relieving pain for longer durations of time than the action of the local anesthetic action.

While the mechanism for TNMB-mediated sustained pain relief is yet to be uncovered, data corroborates its efficacy in relieving chronic myofascial pain of masseteric origin (37,39). The effectiveness of pain relief from TMNB

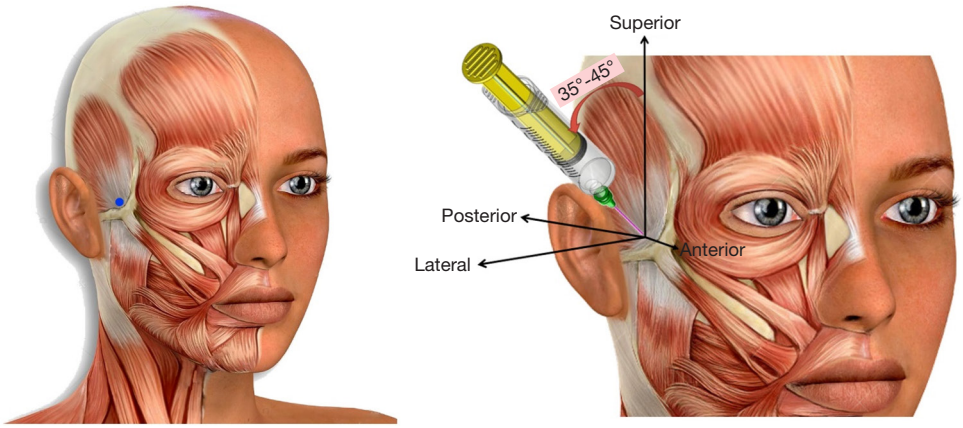

Figure 1 The Temporo-masseteric Nerve Block injection technique. The point of entry for the TMNB injection (left, blue circle) and needle orientation (right). TMNB, Temporo-masseteric Nerve block.

is comparable to Trigger point injections for up to six months (37). The significance of this is two-fold- one, the ability to identify trigger points requires specialized training that is not available to general dentists. As a result, patients with chronic masticatory myofascial pain are often misdiagnosed or subjected to multiple referrals and delayed care. The TMNB is easy to administer and requires no additional armamentarium beyond the dental anesthetic and syringe the general practitioner has ready access to. Second, it overrides the need to identify the active trigger point/s, potentially transforming masticatory myofascial pain into a condition that the general practitioner can readily diagnose and treat.

The key concern that needs to be addressed then is its safety. Over the last seven years that the TMNB has been in clinical use, there have been no reports of any adverse effects, short-term or lasting, from its use (manuscript in preparation) (43). Since the dental anesthetic is used on a routine basis globally, its safety is well-established.

The TMNB as a 'sorting hat' of mTMD into peripheral vs. central phenomena?

We speculate that a peripheral intervention such as the TMNB may be exceptionally effective in the assessment or management of masticatory myofascial pain (mTMD) when the dominant mechanism is local and help identify/delineate those who may have a central mechanism for their myofascial pain by perhaps their poor treatment response to TMNB. This may be critical in appropriately identifying those patients in need of more escalated, interdisciplinary care. There is no data to support this viewpoint, and it is purely hypothetical. However, we conclude that such research may well be warranted by the complexity and heterogeneity of patient presentation in mTMD.

Strengths and limitations

This manuscript critically appraises the literature to present a novel perspective on the management of mTMD and recommends the use of the TMNB as a possible intervention. The TMNB is simple and feasible to administer and is well-tolerated by the patient. However, it should be borne in mind that this discussion is speculative and this approach requires validation.

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Footnote

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